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Bacterial vaginosis due To *Gardnerella Species* and Risk Factors: A Cross-Sectional Study among Women of Reproductive Age at Mbalmayo District Hospital, Cameroon

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ABSTRACT **Published Online: November 20, 2023**

Objectives: Bacterial vaginosis is the most prevalent genital infection, characterized by malodorous vaginal discharge, and has arisen as a public health concern due to its link to sexually transmitted illnesses. The purpose of this cross-sectional study was to determine the prevalence of *Gardnerella species'* bacterial vaginosis and the risk factors related with this infection in childbearing women at the Hospital of District of Mbalmayo.

Methodology: A questionnaire was administered before each vaginal swab sample was obtained. Gardnerella species' bacterial vaginosis was classified as a Nugent score of 7 to 10, and the presence of clue cells.

Results The findings were as follows: 210 women were enrolled in this study. The average age was 29.42±5.15 years, with extremes ranging from 18 to 49 years. The age group with the highest representation (38.67%) was 26-33 years. The prevalence of bacterial vaginosis was 42.85% (90/210), with *Gardnerella species* present at 90% (81/90) and *Mobiluncus species* present at 3.33%. The 18-25 age group was more susceptible to *Gardnerella species* infections (35.80%), although the student group was the most affected (32.09%), and the difference was not statistically significant. With a prevalence of 44.44%, the single group was statistically significantly more exposed to this vaginal infection than the other groups. University-level women had a higher prevalence of *Gardnerella species* infection (54.32%), followed by secondary-level women (37.03%). *Gardnerella species* vaginosis was found in both pregnant and non-pregnant women (38.27% and 61.72%, respectively).

Conclusion: To avoid future obstetric difficulties, this infection must be effectively managed therapeutically.

KEYWORDS:
Bacterial vaginosis, *Gardnerella species*, women, Cameroon

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INTRODUCTION

Bacterial vaginosis (BV) is the most common cause of abnormal vaginal discharge among women of childbearing age which is associated with sexually transmitted disease and adverse birth outcomes (Nzomo et al., 2013).

It is characterized by an increase in vaginal pH, decreased lactobacilli and overgrowth of facultative and anaerobic bacteria (*Gardenerella vaginalis Gardenerella leopoldii*, *Gardnerella piotii*, *Gardnerella swidsinskii*, *Mobiluncus* species, *Bacteroides fragilis*, *Atopobium*, *Prevotella*) either isolated or in combination. The prevalence is in general higher in part of Africa, but in other parts of the world, it has

been shown to vary with race and ethnic group (Kenyon et al., 2013). It is manifested by abundant leucorrhoea with the smell of rotten fish and can cause pain, itching and redness in the vagina (Alcentore et al., 2013). The vaginal cavity is naturally colonized by many bacteria. Lactobacilli or Doderlein flora are the predominant bacteria in the so-called normal vaginal flora (Bohbot, 2001). The disappearance of this flora exposes to bacterial vaginosis. However *Gardenerella species* are isolated with a greater frequency (83 to 98%) in the flora of bacterial vaginosis (Goffinete et al., 2013). Estimates of the prevalence of bacterial vaginosis worldwide range from 12% in Australian women to 29% in North America, and over 50% in women in the Middle East and South Africa (Livengood, 2009). Payne et al. (2020) reported a prevalence of bacterial vaginosis of 17.08% in Dschang and Diagne et al.(2019) found a prevalence of 21% in Senegal . The prevalence of bacterial vaginosis was 3.13% higher in African American women than in white women (Livengood , 2009). The existence of bacterial vaginosis facilitates the acquisition of certain sexually transmitted infections such as *Neisseria gonorrhea* infection, *Chlamydia trachomatis*, *Herpes simplex* type 2 and Human Immunodeficiency Virus infection (HIV) (Anane et al., 2000). Many studies have suggested that bacterial vaginosis may have a role in the development of gynecological disorders such as pelvic inflammation, cervicitis, AIDS, and cervical cancer. Premature birth, abortions, chorio-amnionitis, and postpartum endometritis are all obstetrical concerns related with bacterial vaginosis (Leitich et al., 2003; Guerra et al., 2006; Guaschinio et al., 2006). The purpose of this study was to determine the frequency of Gardnerella species bacterial vaginosis and the risk factors associated with this infection in women of reproductive age at Mbalmayo District Hospital.

MATERIALS AND METHODS:

Type and duration of the study

During April to July 2021, a three-month cross-sectional and descriptive study was carried out at the Mbalmayo District Hospital in Cameroon's Central Region.

Study population and size of the study

210 women between the ages of 18 and 48 who visited the gynaecology department at Mbalmayo District Hospital for consultations on pregnancies, prenuptial agreements, contraception, and infertility made up the study population. Those women who provided written informed consent to participate in the study and agreed to have cervicovaginal swabs taken were included in the study. Women who were menopausal, menstruating, using vaginal ovules or antibiotics were excluded.

According to the prevalence of 17.08% of bacterial vaginosis reported by Payne et al. (2020) in their study in Dschang (Cameroon), the size of our population study was determined using the Lorentz formula.

Sample collection

Participants were urged to refrain from vaginal washing before heading in for a consultation. Specula and sterile swabs were used to perform vaginal swabbing (at the cervix margins) after cleaning the vaginal margins with Dakin's solution. A sterile cotton wool-tipped swab (Henso Medical, Hanghan, Co., Ltd.) was used to collect secretions from the vaginal walls and was used to diagnose bacterial infections in the vagina.

Collected samples were processed immediatly the same day in the Laboratory of Microbiology at the District Hospital of Mbalmayo.

Each sample collected was preceded by a questionnaire.

Participants were interviewed face to face by trained interviewers. The information collected using the survey included baseline information (age, marital status, education level, religion, region of origin), medical history (pregnancy, AIDS), history of self-medication and recent treatments.

Diagnosis of bacterial vaginosis

For bacterial vaginosis, vaginal smears were heat-fixed and Gram-stained then examined by light microscopy by a single reader and the results were interpreted by using a standardized method for diagnosing bacterial vaginosis, as described by Nugent et al. (1991). Bacterial vaginosis was defined as a Nugent score of 7 to 10. Small Gram negative or variable bacilli were assumed to be *Gardnerella species* morphotype associated with clues cells and curved Gram variable to be *Mobiluncus* on direct examination. Sniff test was performed with potassium hydroxide solution (10%). It was positive in case of bacterial vaginosis.

Ethical considerations

Participants were informed about the objectives of the study and the confidentiality and non-mandatory nature of participation in the study. Women were free to withdraw from the study at any time without affecting the quality of care they received. An authorization was obtained from the Director of Mbalmayo District Hospital to carry out the research. The study was submitted to the National Research Ethics Committee for Human Health (CNERSH) to obtain their approval and an ethical clearance was issued under the reference N° 2021/01/675/CE/CNERSH/SP. Moreover, informed and written consent was obtained from patients who agreed to participate in the study.

Statistical analysis of the data

Data was collected in Excel 2013 (Windows Excel, Microsoft, Redmond, WA, USA). The data collected was analysed statistically using SPSS version 21.0. Results were interpreted by the Chi square test with a degree of significance (p) at the 5% threshold.

RESULTS

Distribution of participants according to baseline characteristic

In this study, 210 women were enrolled. The average age was 29.42±5.15 years with extremes of 18 to 49 years. The most represented age group was that of 26-33 years (38.67%). 58.57% of women had a university level, followed by those with a secondary level (33.80%). Women in cohabitation were the majority (38.09%) followed by singles (29.52%) and married women (28.77%). According to professional status, 31.90% of women were civil servants, followed by women in liberal professions (25.5%), then the student group (24.5%) and housewives (17.61%). In this study, 44.76% of women were pregnant and 5.71% of women were HIV positive. The prevalence of bacterial vaginosis was 42.85% (90/210) with the presence of *Gardnerella* species of 90% (81/90) and *Mobiluncus* species of 3.33% (03/90)

Bacterial vaginosis caused by *Gardnerella vaginalis* and risk factors

The 18-25 years old age group was more exposed to *Gardnerella species infection* (35.80%) followed by the 26-33 years old age group with a prevalence of 30.86%. But the difference in prevalence between the groups age was not significant (p= 0.121). The different socio-professional groups are affected by *Gardnerella species infections*, but the student group is the most infected with a rate of 32.09%, and the difference was not significant. The single group was more exposed to this vaginal infection with a prevalence of 44.44% and the difference with the others groups was statistically significant (p=0.001). (Table 1)

University-level women were more infected with *Gardnerella* species infection with a prevalence of 54.32% followed by secondary-level women (37.03%). The difference between education levels was not significant. *Gardnerella* species infection in AIDS positive women was 12.34%. Women who were not pregnant suffered more from this infection (61.72%) than pregnant women (38.27%) and the difference was statistically significant (Table 2).

DISCUSSION

Bacterial vaginosis has emerged as a public health problem due to its association with sexually transmitted disease. It is a fairly common infection in women of childbearing age.

The prevalence and risks factors of *Gardnerella species infection* in the study population

The prevalence of bacterial vaginosis due to *Gardnerella species* in this study was 90% (81/90). This rate proves that bacterial vaginosis is a frequent infection in our environment. It poses a real problem for maternal and child health because of its potential role in the occurrence of gynecological and obstetrical complications. These findings are higher than those obtained by Payne et al. (2020) in Dschang (17.08%) and Diagne et al. (2019) in Senegal (21%). Moreover, they are also higher than those obtained by Esber et al. (2016) in Malawi; 51%. The differences in reported prevalence in different countries could be due to environmental, behavioral, socio-economic status and the screening techniques used were different between studies. Women aged 18 to 33 were more infected with *Gardnerella* species infection; 66.66%. These results corroborate those of Faye-Kette et al. (1992) in Abidjan concerning the same age group with bacterial vaginosis of 63.84% and those of Tamboura *et* al. (2004) in Burkina who reported a prevalence of 64.3% among women of the same age group. This high rate can be justified by the fact that at this age group, women are in full genital activity which could destroy the flora of Doderlein and expose to bacterial vaginosis. The youngest (18-25 years old) have multiple sexual partners and are sometimes adept at oral contraception and intravaginal practices. Aziz et al. (2019) in Yemen reported that people under 25 were twice as likely to have bacterial vaginosis. Regarding women infected with *Gardnerella* species, 91.35% had the minimum level of secondary education. The results of Tamboura et al. (2004) corroborate our results, they find that 64.3% of women with bacterial vaginosis had a minimum high school education. On the other hand, Bradshaw et al. (2015) reported that bacterial vaginosis was associated with an education level of less than 13 years of study. Our result seems paradoxical, because the women in our study were educated and would certainly not apply good hygiene practices to their vaginal cavity and sometimes they informed themselves in a biased way in social networks (Aziz et al., 2019)

Distribution of Gardnerella species infection according to professional status, marital status, pregnancy and AIDS status

The prevalence of *Gardnerella species infection* was higher among students (32.09%). Faye-Kette et al. (1992) reported a similar rate in Abidjan among students; (32%), as well as Tambura et al. (2004) (28.6%) in Ouagadougou. The exposure of this group to bacterial vaginosis would be due to frequent sexual intercourse and poor knowledge of hygiene of the vaginal cavity. Single people had the highest rate of bacterial vaginosis infections due to *Gardnerella* species (44.44%) followed by women in concubinage (29.62%). The results of the study conducted by Anagounou et al. (1994) reported a prevalence of 40% among unmarried people. This finding corroborates that of this study. The result can be justified by the fact that single people have multiple sexual partners and multiple sexual relations which could damage their vaginal flora and would therefore be exposed to bacterial vaginosis.

87.65% of women with *Gardnerella* species infection were HIV-negative while 12.34% of women with this same vaginal infection were HIV-positive. This result is similar to Keita et al. (2009) in Mali which reports that 90% of seronegative women were infected with *Gardnerella vaginalis.* However,

some recent research suggests that bacterial vaginosis is associated with the risk of AIDS transmission by weakening the vaginal mucosa, it potentiates HIV infection (Alcaide et al., 2017). There was no significant association between bacterial vaginosis due to *Gardnerella* species and AIDS infection (p=0.151). In this study, 38.27% of pregnant women suffer from *Gardnerella* species infection against 61.72% of non-pregnant women and the difference was statistically significant (p= 0.032). This lower prevalence of bacterial vaginosis due to *Gardnerella* species in pregnant women can be justified by the fact that during pregnancy the woman's vaginal cavity becomes more acidic through the secretion of many hormones and the presence of a high concentration of glycogen, a nutrient substrate for lactobacilli which prevent vaginal infections. Tchelougou et al. (2013) in his study reported a prevalence of *Gardnerella* infections of 55.31%. This high prevalence of bacterial vaginosis due to *Gardnerella* species in pregnant women in their study can be justified by the fact that the screening methods (culture of the samples) were different from that used in this study.

CONCLUSION

Women of reproductive age (18-33 years) are exposed to *Gardnerella* species infections, especially single women with a university level. This demonstrates the need to perform at least one gynecological test for bacterial vaginosis in women during their reproductive life. The effective therapeutic management of this infection must be undertaken to avoid future obstetrics complications. A polymerase chain reaction method should be performed to identify the different species of *Gardnerella* bacteria in further studies.

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Conflict of interest

The authors declare that they have no conflict of interest

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